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Reply Appendix Item 1

Excerpt from Pl. Ex. 205A

George S. Knapp Letter to W. E. Stanley,
July 13, 1940,
folders 1-3, Governor Payne Ratner Papers
Kansas State Historical Society, Topeka, Kansas
[08-15-00285] (Certified Copy)

A-7

KANSAS STATE BOARD OF AGRICULTURE

J.C. MOHLER • SECRETARY
STATE HOUSE • TOPEKA

July 13, 1940

Mr. W. E. Stanley,
830 First National Bank Building,
Wichita, Kansas.

RE: Colorado vs. Kansas

Dear Gene:-

• • • • •

I am wondering what purpose would be served by putting into a proposed consent decree a provision that no additional acreage should be put under irrigation in Colorado in the Arkansas River valley. Would it be proposed that all water above the amount needed for that acreage should be allotted to Kansas or be considered as surplus to be divided in some manner between Colorado and Kansas? While Colorado might refrain from constructing additional ditches for new projects yet there are many ways in which their people could increase their use of water, and even the actual number of acres irrigated, without Kansas being able to show that that was done unless an examination of the acreage actually irrigated was made each year. Many of the farmers in the Arkansas River basin do not have sufficient water to irrigate all of the farm each year and, consequently, one field is watered one year and another the next. If water could be obtained, the user could materially increase the acreage actually irrigated without the state engineer's and census reports showing any increase

in irrigated acreage. In addition to that many water users can, and in recent years have, materially increase their use of water without increasing ditch diversions by the construction of pumping plants which pump water from wells on individual farms or even pump into some of the ditches and thus they use more water on the land than head-gate deliveries show. Pumping depletes the ground water reservior and intercepts return flow which would become stream flow if not intercepted. Where extensive pumping lowers the reservoir below stream bed, stream flow sinks into the bed to recharge it, thus pumping imposes an additional but unmeasured burden on the water supply.

• • • • •

Reply Appendix Item 2

Excerpt from Pl. Ex. 514

**Supreme Court of Colorado,
Case No. 27738, *Kuiper v. AT&SF Railway*,
Amendments to the Rules and Regulations on the
Arkansas River, Transcript of
Testimony March 1975, District Ct.,
Water Div. No. 2, Cases Nos. W-4079 et al., 1011 pp.**

• • • • •

[Vol. I, pp 213-14]

[Direct Testimony of Dr. Danielson]
[S]o that if you will look at page 22 [Pl. Reply App., Item 9] of exhibit I [the 1975 Colorado State Engineer Report, Jt. Ex. 94 in No. 105, Orig.] you will find there listed by year, first the year and then the total electric power consumed and these records were taken both from the U.S.G.S. and from Colorado State University which more or less collects and correlates these power records, and, then, the estimate of total water pumped in terms of thousands of acre feet, and the footnote explains what I just went through, ...

• • • • •

Q. In 1972 on page 22 it appears that the total water pumped exceeds 200,000 acre feet.

A. Yes, that is correct.

• • • • •

Reply Appendix Item 3

Colo. Ex. 57

Letter dated April 10, 1951, from Hans Kramer, Chairman and Representative of the United States, Arkansas River Compact Administration, to Col. Charles H. McNutt, District Engineer, U.S. Army Corps of Engineers.

COPY

220 Bush Street
San Francisco 4, California
ARKANSAS RIVER COMPACT ADMINISTRATION
Lamar, Colorado

April 10, 1951

Colonel Charles H. McNutt, C.E.
District Engineer
Corps of Engineers, U.S. Army
P.O. Box 1538
Albuquerque, New Mexico

My Dear Colonel:

This will acknowledge receipt of letter from your office dated 5 April 1951, File SWKGC, regarding the availability of the final operation studies of John Martin Reservoir which were made for the consummation of the Colorado-Kansas-Arkansas River Compact. Your communication is the result of previous correspondence with Judge Stone, he having furnished me a copy of his letter to you dated March 29, 1951.

I appreciate fully the policy of your office to coordinate basic criteria used in studies for new project planning with those used in the formulation of existing compacts. However, in the case of the Arkansas River Compact no final operation studies of John Martin Reservoir were actually made, nor did any of the engineering compilations that were made during the negotiation of the Compact enter into the ultimate wording. Hence, strictly speaking, "the final operation studies" referred to in your letter are non-existent.

Perhaps it would help toward understanding the preceding statement, if I were to trace just what was done in the way of

engineering studies during the negotiation of the Arkansas River Compact. The Commission's Committee on Engineering Data and Studies (of which I was chairman) undertook initially (1) to assemble pertinent engineering data upon which the engineers would be in full agreement and (2) to make engineering analyses upon which the Commission could rely in formulating a compact. This assignment, on which work was started in 1946, was predicated on the initial assumption that some fixed criteria for operating John Martin Reservoir would have to be agreed upon as a basis for the Compact, it being the initial objective of the Engineering Committee to analyze and evaluate the results obtained from various hypotheses. In organizing the work of the Engineering Committee, it was contemplated that its final report would consist of three main parts, viz. I—Engineering Data; II—Analysis of Historic Flow; III—Operation Studies.

In the execution of that program the Committee submitted its First Interim Report on June 26, 1947. This report, dealing only with Part I, consisted principally of a series of tables of pertinent stream flow and diversion data compiled from various sources (e.g., U.S.G.S., State Engineers) for

convenient reference. It also included engineering data on John Martin Reservoir from which some evapo-transpiration and siltation estimates were computed.

A Second Interim Report, also on Part I, was submitted on November 24, 1947. This report merely rounded out the First Interim Report with respect to stream flow, diversion and storage records by including the period 1943-1946 during which the then partially completed John Martin Reservoir had operated. It also presented some calculated data on accretions for the periods 1908-1942 and 1943-1946.

ies that were mentioned in Judge Stone's letter. These studies had no bearing or subsequent formulation of the Compact.

Neither of the two Interim Reports was ever released for public use nor were they included in the Official Record of the Commission, it having been the prevailing thought that publication would be in the form of a final report which would include operation studies, if and when such a final report were made.

However, even before the date of the Second Interim Report, the trend of the negotiations took a decided turn away from the concept of fixed operating conditions based on firm interstate allocations toward the more flexible philosophy, best described as "live and let live," which became the basis of the ultimate Compact. That principle, which was an outgrowth of the Interim Executive Agreement between Colorado and Kansas governing the operation of John Martin Reservoir during the period of compact negotiations, permitted either State to obtain water from John Martin Reservoir (when stored water was available) without regard to the other State and without the need for keeping books to balance hypothetical debits and credits. Further background details of this evolution are obtainable from careful study of the Official Record of the Colorado-Kansas-Arkansas River Compact Commission, particularly the 7th, 8th, 9th and 10th meetings. A copy of this Record was furnished to your office on February 14, 1950.

With agreement upon a flexible and indeterminate basis of interstate apportionment, it was obvious that operation studies of John Martin Reservoir could serve no useful purpose in spelling out the terms of the compact, if indeed such studies were practicable under the circumstances. Accordingly, operating studies were dispensed with then and there and that phase of the work of the Engineering Committee was suspended after the rendition of its Second Interim Report. No "Final Report" was ever made. Thus, as stated earlier in this letter, no final operation studies were authored by the Compact Commission. By the same token, such studies and/or analyses as were undertaken in the earlier stages of compact negotiation (when fixed allocations were pre-

supposed) are manifestly worthless for current consideration in relation to the terms of the Compact that was actually consummated.

Colonel Charles H. McNutt - 3 - April 10, 1951

Let me assure you that the above explanation, lengthy and detailed though it is, is not intended in any way to deny your office access to any available material that may be helpful to you. My explanation is intended merely to support the warning in Judge Stone's letter that unoriented and injudicious use of such material might be not only a waste of effort but could lead to erroneous or confused results. On the other hand, it may well be that some of the tabulations of existing data which were compiled in the Interim Reports could be useful in your current studies if brought up to date by your office.

It occurs to me that the most satisfactory way to arrive at a clear and complete mutual understanding of this matter is for the principal parties to get their feet under and their heads together over the same table. To that end I would suggest a get-together, preferably in Judge Stone's office in Denver where the Interim Reports and other material are on file. In addition to representatives of your office and myself such a conference should include Mr. R. M. Gildersleeve, who worked closely with the Commission's Engineering Committee and Mr. D.C. Bondurant, formerly of your office and now in the Missouri River Division, who actively assisted me on the Committee and who is not only well acquainted with the evolution of the Compact, but had intimate knowledge, in his former capacity, of its impact on studies for new projects in the Arkansas Basin. From my viewpoint such a huddle is the best procedure toward obtaining the desired coordination of studies.

I expect to be in Denver in connection with other business on Monday, April 30, 1951, and would be glad to reserve my time from 10:00 a.m. to 2:00 p.m. for a conference as suggested above.

If you deem such a meeting advisable please have your office issue invitations to those concerned.

Sincerely yours,

Hans Kramer
Chairman and Representative of the United States
Arkansas River Compact Administration

cc: Judge Clifford H. Stone
Mr. Robert V. Smrha

Reply Appendix Item 4

Excerpt from Def. Ex. 623

Patterson, C.L. Program for the Improvement of Irrigated Agriculture in the Arkansas Valley in Colorado (Feb. 1932)

[29-30]

• • • • •

Ground Waters.

As has been explained, surface water and ground water are so intimately and directly related, that it is wrong to consider them separately. But because it is customary, that plan has been pursued.

Many of the recent irrigation developments have involved the use of ground waters, some projects being of the drainage type, and many of them involving pumping plants. In the Arkansas Valley there are dozens and perhaps hundreds of irrigation pumping plants, few of which have observed the existing regulations regarding the filing of maps and statements of claim or have rights established by adjudication, or which operate with any administrative recognition. New projects are being promoted and constructed, and as water values increase, the confusion will be multiplied still further. The uncertainty as to the future status of stream flow rights is increasing. The negative public policy is promoting conflict and litigation. Other unfortunate features are the fact that investments have been and are being made some of which may be destroyed, and that no proper legal status is being established under which these possibilities of reclamation may attain the value and permanence they may deserve.

• • • • •

Reply Appendix Item 5

Excerpt from Jt. Ex. 5

Interim Report of Committee on Engineering Data and Studies to Colorado-Kansas Arkansas River Compact Commission (June 26, 1947)

[3]

* * * * *

To evaluate the resulting effects of operations of John Martin Reservoir, determinations and definitions of the water supply and diversion conditions and relations that historically prevailed along the Arkansas River in Colorado Water Districts 14, 17 and 67, and in Kansas between the Stateline and Garden City, are necessary. Unnecessary data not included in the attached tabulations are streamflow at stations on the Arkansas River upstream from Canon City in Colorado, and downstream from Garden City, in Kansas, and at stations on all tributary streams other than the Purgatoire River near its mouth. Also not included are the diversions by ditches from the Arkansas River in Colorado Water Districts 11 and 12, upstream from the western boundary of Pueblo County, and by ditches from all tributaries of the Arkansas River. Irrigation supplies derived from pumps in both States are not included in the tabulated diversions.

* * * * *

Reply Appendix Item 6

Excerpt from Jt. Ex. 19

Minutes of meetings of the Arkansas River Compact Administration from 1949 through December, 1984

MINUTES OF
ARKANSAS RIVER COMPACT ADMINISTRATION
ANNUAL MEETING
December 14, 1954
LAMAR, COLORADO

Attendance -
For Colorado:

Ivan C. Crawford, Denver; Director Colorado Water Conservation Board
Harry B. Mendenhall, Rocky Ford; Chairman of Colorado Representatives
Harry C. Nevius, Lamar; Administration Secretary and Treasurer

For Kansas:

Wm. E. Leavitt, Garden City.
R. V. Smrha, Topeka.
Roland H. Tate, Garden City, Vice Chairman & Chairman of Kansas Representatives

For the United States:

Brig. Gen. Hans Kramer, San Francisco, Calif.; Chairman of the Administration

• • • • •

[13-14]

General Kramer said that the basic motivating principle in formulation of the Compact was, "Live and Let Live". In December 1948 the final discussion on Article IV-D was held. At that time Commissioner Mendenhall suggested a review and asked for a

change in wording. The word "material" was inserted after that discussion and the decision to insert the word was to eliminate too rigid interpretation.

General Kramer quoted pertinent passages from the Record (pp 17- 32,33).

General Kramer said, after listening to all the discussion and studying the matter from the viewpoint of the intent of those who wrote the Compact, that he considers the amount of depletion to be not material. However, if, for the sake of discussion, it should be presumed that the 530 Acre Feet average depletion is material, then too, the amount of 65 Acre Feet average sediment reduction must likewise be considered material. This would mean to the United States that the life of the Reservoir, from this point of view, will be 50 years longer or an equivalent of 1 to 2 percent. The whole question resolves itself to, "Is the amount material?" The suggestion that the Golden Rule and the principle of "Live and Let Live" be adhered to was stressed by General Kramer as his closing remark.

General Kramer then resumed the Chair.

Judge Tate said he would like to make a statement on behalf of the Kansas position. He and his co-workers on the Administration as the Kansas delegation concur fully with Governor Arn and they have no desire to deviate from his views as expressed in his letter of August 8, 1954 to the Chief of Engineers. With reference to the averages spoken of, they may be relatively unimportant, however, there are times when they may become material. Kansas thinks that there may be ways to relieve the depletion by operation in District 67 and other upstream users. He believes that the depletion should be absorbed entirely by Colorado's portion of the river—not District 67 and Kansas alone.

• • • • •

Mr. Smrha moved: The Administration does not approve, at this time, the Project as proposed by the Corps of Engineers on the Purgatoire River.

Mr. Nevius seconded the motion remarking that his main concern was the plan of operation and the effect that it might have on the area below the Project.

Mr. Crawford stated that he was emphatically opposed to the motion. He felt that its passage would be, in effect, closing the door on future development of the Arkansas basin above John Martin Reservoir. He said he believed that action today might save life and property in upstream communities.

Chairman Kramer stated that it was not incumbent upon the Administration to make comments either way, and that the matter could be tabled, if desired.

Mr. Tate reviewed the action taken by the Administration in past meetings. He agreed with General Kramer that the U. S. Representative should make a report to the Government and that the Corps of Engineers should be advised of the Administration's views.

A brief discussion on a parlimentary matter ensued followed by a short recess.

* * * * *

Upon reconvening, Chairman Kramer asked if further discussion was desired on Mr. Smrha's motion.

On vote, Colorado voted Aye with Mr. Crawford dissenting. Kansas voted Aye, and the motion was declared passed.

Chairman Kramer again reminded the Administration of the next scheduled regular meeting of March 22, 1955.

The meeting adjourned at 2:45 P. M.

* * * * *

The above minutes were approved by action of the Administration March 22, 1955.

Hans Kramer (Brig. Gen. U.S.A.-Ret.)
Administration Chairman

Harry C. Nevius,
Administration Secretary

Reply Appendix Item 7

Excerpt from Jt. Ex. 32

McDonald, J. William, Memorandum to Arkansas River Compact Administration re ARCA Investigation (October 4, 1985)

[15]

• • • • •

c. Previous Well Studies.

Third, the Kansas' engineering consultants stated that previous investigations of well pumping in Colorado demonstrated that well diversions had depleted surface streamflows. The problem with the previous studies cited by the Kansas engineering consultants is that the theoretical depletions from well depletions are not reflected in actual streamflow records. For example, the single and double-mass diagrams involving the flows of the Arkansas River at Las Animas and usable stateline flows prepared for this investigation do not show a gradual change in slope that would reflect depletions caused by well pumping. Instead, the curves of the Arkansas River at Las Animas have fairly constant slopes. The curves involving usable stateline flows show a sharp break downward beginning in 1974 and continuing through 1979 and then a break upward beginning in 1980. This corresponds to the decline in tributary inflow, rather than to well development in Colorado.

• • • • •

[22-23]

D. Pre- and Post-Compact Flows of the Arkansas River at Las Animas.

Mr. Pope also concluded that the flow of the Arkansas River at Las Animas had declined during the period 1949-1975 as compared to the precompact period. (Pope Report, p. 22, §5). However, I believe that Mr. Pope and I are in agreement that this decline is explained by the change in water rights administration

in Colorado when there is water in the conservation pool in John Martin Reservoir. (p. 10).

II. Matters for Further Investigation

As noted above, both reports are in general agreement that the changes in relationship shown by the double-mass curves occurring since 1974 have been below the Las Animas gage on the Arkansas River. This isolates the reach appropriate for further investigation.

In my opinion, plains precipitation during the period 1974-1982 is a matter that warrants further investigation. In addition, tributary inflow from plains drainage areas may have declined during the period 1974-1979 as the result of soil conservation measures. Such conservation measures were found to have had a substantial effect on streamflow in the Republican River Basin. If, after an investigation of the factors which appear most likely to have caused the decline in usable stateline flows during the period 1974-1982, including: 1) reduced diversions by ditches in Colorado Water District 67; 2) the operating plan for John Martin Reservoir; 3) decreased plains precipitation; and 4) soil conservation measures, it does not appear that this decline can be entirely attributed to such factors, then a further investigation of possible causes may be justified. However, at this time, I cannot agree to undertake an investigation into well development in Colorado when the single and double-mass diagrams do not suggest that well development in Colorado has had an impact on usable stateline flows.

Reply Appendix Item 8

Excerpt from Jt. Ex. 88

Simons, Li and Associates, Inc., 1984.
Preliminary Assessment, Development
and Administration
of Water Resources in the Arkansas River Valley

[iv-v]

• • • • •

V. Conclusions and Recommendations

Major conclusions from this investigation are:

1. The Arkansas River Compact entitles Kansas to the pre-compact usable stateline flows and a 40 percent share of the conservation benefits resulting from the construction and operation of John Martin Reservoir.

2. Usable stateline flows *increased* slightly after the compact until about 1973. Since 1974, however, usable flows have *declined* to about 45 percent of pre-compact values. This has resulted in *material depletion* of Kansas ditch diversions.

3. Post-compact well development in Colorado has caused approximately 150,000 acre-feet per year of depletions to the Arkansas River. It is likely that depletion associated with Colorado well development is a major cause of *decline* in usable stateline flows.

4. Operation of the Trinidad Project since 1979 has caused 26,000 to 35,000 acre-feet of depletions in excess of those which would have resulted from the operation approved by the Compact Administration.

5. Kansas' entitlement to usable quantities of water under the Arkansas River Compact has been *materially depleted* by post-compact development in Colorado. A conservatively low estimate of this depletion for the period of 1974 to 1981 is 40,000 to 50,000 acre-feet per year.

The major recommendations for further study are:

1. The findings of this preliminary assessment should be verified, including additional comparisons of pre- and post-compact use in Colorado.

2. The operation of the Trinidad Project should be analyzed in more detail.

3. Colorado well development and its effect on Kansas should be further documented and analyzed.

4. The operation of the Pueblo Reservoir winter water storage program should be reviewed and studied to determine if the program has or is causing an adverse impact to the State of Kansas.

5. The operation of John Martin Reservoir should be evaluated to determine the long term effect of the 1980 Storage Resolution.

6. Potential mechanisms to mitigate material depletion to the compact entitlement of the State of Kansas should be developed.

• • • • •

[1.1]

I. INTRODUCTION

1.1 *Scope and Nature of Study*

Simons, Li & Associates, Inc. (SLA) was authorized to conduct a water resources investigation of the Arkansas River basin by the State of Kansas, Office of the Attorney General in September 1983. This report describes the preliminary study of flow conditions of the Arkansas River basin since the signing of the Ar-

kansas River Compact by the States of Colorado and Kansas in late 1948. The purpose of this study was to compile and evaluate information necessary to determine if the State of Kansas has sustained material injury under the terms and conditions of the compact.

The scope of work for this study is summarized below as excerpted from the contract for professional services between SLA (Second Party) and the State of Kansas (First Party) dated September 26, 1983:

1. Second Party hereby agrees to perform a study and provide a written report via First Party to the Kansas Legislature. Such report shall contain the opinion of a qualified expert as to whether there is probable cause to believe that since the year 1949 the development of the Arkansas River basin in Colorado by federal and/or state agencies, by private enterprise, or by combinations thereof, which may involve construction of dams, reservoirs, or other works for the purpose of water irrigation and control, as well as the improvement and prolonged functioning of work already existing, has materially depleted in usable quantity or availability water for the water users in Colorado and Kansas. In addition, Second Party hereby agrees to include in said report an evaluation of the current and past operating procedures utilized at the Trinidad Dam and Reservoir project in Trinidad, Colorado. In addition, Second Party hereby agrees to include in the above-mentioned report a statement concerning whether any said depletion has resulted in material injury to the State of Kansas.

2. Second Party hereby agrees to provide a summary of the factual basis for any opinion expressed by any expert in the above-mentioned report.

• • • • •

Reply Appendix Item 9

Excerpt from Jt. Ex. 94

Stream Depletion by Wells in the Arkansas River Basin — Colorado, 1975, Office of the State Engineer

Year	Total Electric Power Consumed (M.KWH.)	Total Water Pumped (1000 AF)	Year	Total Electric Power Consumed (M. KWH.)	Total Water Pumped (1000 AF)
1940	1.243	2.5	1957	5.788	84
1941	0.6	5	1958	7.024	79
1942	0.358	6.5	1959	11.223	153.5
1943	0.831	7	1960	11.486	146
1944	0.459	9	1961	9.627	121
1945	0.590	9.5	1962	11.070	132
1946	1.749	15	1963	20.781	177.9
1947	1.207	15	1964	23.252	192.9
1948	1.234	15	1965	12.990	120.1
1949	2.193	23.5	1966	16.733	138.8
1950	3.492	31	1967	16.734	140.3
1951	3.483	31	1968	18.287	161.1
1952	4.518	46	1969	13.962	119
1953	6.090	58	1970	15.576	132
1954	9.336	94	1971	22.008	183.7
1955	9.382	97.5	1972	25.080	208.3
1956	11.925	152			

TABLE 7. Ground Water Withdrawal by Irrigation Wells—Arkansas River (Canon City to State Line)

Source:

1940-1962 From USGS basic data release no. 21

1963-1968 From USGS basic data release no. 21 plus estimates for San Isabel elec. co. using regression equation Y = 8.0322E + 6.897, Y = GW withdrawal (1000 AF) E = elec. power consumed (M.KW)

1969-1973 Estimated using regression equation. This eqn. is based on USGS data (Basic data release 21) and power data (CSU)

• • • • •

[53]

CONCLUSIONS

The increasing use of ground water for irrigation in the Arkansas River basin since 1950 has affected stream flows in such a way as to deprive senior water users of a portion of their lawful water supply. This study has conclusively shown by means of a water budget analysis and mass diagrams that excessive pumping from the Arkansas River alluvium has resulted in the following:

1) Decrease in stream flows below Canon City;
2) Decrease in the quantity of water diverted from the main stem of the Arkansas River;
3) Reduction in return flows as indicated by a decrease in the river gain between Canon City and the State line.

The "Net River Gain" section of this report indicates that the decrease in diversions and return flows is equivalent to the consumptive use of well water, which from 1965 through 1972 average 112,800 Ac-Ft per year. This amount is obviously significant and of such a magnitude that the restoration of the value of the senior water right to its pre-well development level is warranted. This does not necessarily spell doom for the well users in that water management schemes can be devised that will prevent injury to senior surface water users while at the same time allowing continued ground water withdrawals.

• • • • •

Reply Appendix Item 10

Excerpt from Jt. Ex. 139

Barker, R.A., L.E. Dunlap, and C.G. Sauer, 1983.
Analysis and Computer Simulation of
Stream Aquifer Hydrology,
Arkansas River Valley, Southwestern Kansas.
U.S. Geological Survey, Water-Supply Paper 2200.

• • • • •

[55]

Results of model experimentation with hypothetical 1970-79 conditions show that water levels and streamflow within the study area were more directly affected by the reductions in incoming streamflow (compared to 1951-69 average conditions) than by either the smaller than average amounts of annual precipitation or the increased pumpage during the 1970's. Simulation indicates that: (1) The effects of less recharge during periods of smaller than average amounts of precipitation were offset by more recharge during brief periods when precipitation was much greater than the mean monthly amount and (2) the effects of the increased pumpage were partly offset by increased recharge resulting from increased irrigation.

• • • • •

Reply Appendix Item 11

Excerpt from Transcript vol. 10

(Cross-examination of Douglas Littlefield)

[42-43]

• • • • •

Q. DO YOU KNOW IF MR. PATTERSON PREPARED A REPORT THAT DEALT WITH GROUND WATER IN THE ARKANSAS RIVER VALLEY IN THE EARLY 1930S?

A. I'M UNFAMILIAR WITH THE REPORT.

Q. I WOULD LIKE TO HAND YOU WHAT HAS BEEN MARKED AS DEFENDANT'S EXHIBIT 623 AND ASK YOU IF YOU CAN IDENTIFY IT.

A. THIS IS A REPORT BY C.L. PATTERSON, CONSULTING ENGINEER, ENTITLED "PROGRAM FOR THE IMPROVEMENT OF IRRIGATED AGRICULTURE IN THE ARKANSAS VALLEY IN COLORADO." IT IS DATED FEBRUARY, 1932. AND APPARENTLY YOU OBTAINED A COPY OF THIS FROM MY FILES DURING MY DEPOSITION, BECAUSE THE FRONT PAGE HAS A COPY OF MY FILE FOLDER HEADINGS.

Q. DO YOU RECALL REVIEWING THIS REPORT?

A. I DON'T RECALL REVIEWING IT. I'M CERTAIN THAT I LOOKED THROUGH IT AT SOME POINT.

Q. IS THIS ONE OF THE DOCUMENTS YOU HAD COPIED AT THE COLORADO STATE HISTORICAL SOCIETY?

A. YES. THIS APPARENTLY IS FROM THE ARKANSAS VALLEY DITCH ASSOCIATION PAPERS.

• • • • •

[46-47]

• • • • •

Q. DOESN'T IT APPEAR FROM THIS REPORT THAT THERE WAS A GREAT DEAL OF CONFUSION ABOUT THE NATURE OF RIGHTS TO GROUND WATER AMONG COLORADO WATERS USERS AT THIS TIME?

A. THAT CERTAINLY WOULD BE A FAIR CONCLUSION, YES.

Q. DO YOU HAVE ANY REASON TO BELIEVE THAT THIS CONFUSION WAS ANY LESS IN THE 1940S?

A. I DON'T — HAVE NO WAY OF KNOWING.

• • • • •

Reply Appendix Item 12

Excerpt from R. vol. 63

April 16, 1991
(Direct Examination of Robert Longenbaugh)

[189-90]

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Q. ARE YOU FAMILIAR WITH THE PRACTICES OF FARMERS IN THE ARKANSAS VALLEY RELATED TO OPERATION OF IRRIGATION PUMPING PLANTS?
A. YES, I AM.
Q. WHAT IS THE BASIS OF YOUR KNOWLEDGE?
A. MY BASIS IS SERVING AS EXTENSION IRRIGATION SPECIALIST THROUGHOUT THE '70S, AND ALSO THE FACT THAT I MEASURED OBSERVATION WELL NETWORK THROUGHOUT THE VALLEY IN THE '60S. AND IN ADDITION, THE STUDIES THAT WERE DONE WITH COLORADO STATE UNIVERSITY AND THE U.S.G.S. IN THE PERIOD 1962 THROUGH '64 AND '65.
Q. I ASKED YOU ABOUT THIS PREVIOUSLY, BUT WHAT IS YOUR OPINION CONCERNING THE AVERAGE EFFICIENCY OF PUMPING PLANTS IN THE ARKANSAS VALLEY?
A. I WOULD SAY THAT I WOULD EXPECT A VALLEY WIDE AVERAGE TO BE 40 TO 45 PERCENT.
Q. HAVE THEY CHANGED —
A. THAT WOULD BE 1985 CONDITIONS.
Q. HAVE THEY CHANGED OVER TIME?
A. YES, THEY HAVE.
Q. WHAT CHANGES HAVE OCCURRED?
A. THEY HAVE DECREASED IN EFFICIENCY OVER TIME BECAUSE OF THE WEAR OF THE PUMP AND THAT THEY DON'T CHANGE OUT THE PUMPS. SO THE AGE OF THE PUMPS IN MY OPINION IS OLDER EVERY YEAR, AVERAGE AGE OF THE PUMPS IN THE VALLEY.

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Reply Appendix Item 13

Excerpt from R. vol. 65

April 18, 1991
(Cross-examination of Robert Longenbaugh)

[69-70]

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Q. BUT AT SOME POINT IT WILL HAVE TO BE CHANGED; IS THAT RIGHT?

A. I DON'T KNOW. WE HAVE GOT PUMPS DOWN THERE NOW, MR. DRAPER, THAT ARE — WHEN THEY ARE SERVICED, I SAW AND OBSERVED PUMPS IN MY FIELD TRIP IN JUNE WHEN THE DISCHARGE PIPE HERE JUST SPEWING WATER EVERYWHERE, COMPLETELY RUSTED OUT. HOW A FARMER CAN NOT BE DOING WHAT HE SHOULD BE DOING AND WASTING THAT MUCH WATER, I DON'T UNDERSTAND.

WHEN YOU PULL PUMPS AND COLUMN PIPE OUT, IT IS NOT UNCOMMON TO FIND COLUMN PIPE HAVING HOLES IN THE SIDES. THE WATER SQUIRTS OUT THROUGH THE BOTTOM OF THE PUMP, GOES DOWN THE WELL CASING. I HAVE MADE PUMP EFFICIENCY TESTS OF 5 PERCENT, 5 PERCENT EFFICIENCY, 10 PERCENT EFFICIENCY. AND, YES, I CAN HOPE WE GET THE FARMERS INTERESTED IN CHANGING IT OUT. I CAN'T GUARANTEE YOU THAT, EITHER.

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Reply Appendix Item 14

Excerpts from Transcript vol. 77

(Direct Examination of Jeris Danielson)

[30-31]

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Q. IS YOUR ANALYSIS HERE, WITH RESPECT TO THE EFFECTS OF PUMPING, WAS THAT BASED ON THE ACTUAL PUMPING AMOUNTS OR ON THE DECREED AMOUNTS FOR WELLS?
A. I BELIEVE THE CALCULATION WAS BASED ON THE PUMPING AMOUNTS SHOWN IN TABLE 7 AT PAGE 22 [of Jt. Ex. 94, Reply App., Item 9.]
Q. IN OTHER WORDS, THE ACTUAL PUMPING AMOUNTS?
A. WELL, I CAN'T SAY "ACTUAL." I AM NOT SURE WE KNOW THE ACTUAL. I THINK THE VALUES THERE — IF YOU LOOK AT THE FOOTNOTE IN THE TABLE — INDICATES SOURCES AND TECHNIQUES OF ESTIMATES. SO I WOULD NOT REPRESENT TO YOU THAT THESE ARE THE ACTUAL PUMPING. THESE WERE THE BEST THAT MY STAFF COULD DETERMINE IN 1972.
Q. OF ACTUAL PUMPING?
A. OF ESTIMATED PUMPING, YES.
Q. THESE ARE NOT THE DECREED AMOUNTS FOR THE WELLS IN THE VALLEY; IS THAT RIGHT?
A. I DON'T BELIEVE SO, NO.

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Reply Appendix Item 15

Excerpt from R. vol. 78

May 16, 1991
(Cross-examination of Jeris Danielson)

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[85]

Q. OKAY. ON PAGE 53 [of Jt. Ex. 94, Reply App. Item 9], MR. DRAPER ASKED YOU SEVERAL QUESTIONS ABOUT THE THREE CONCLUSIONS SET FORTH ON PAGE 53. DO YOU STILL AGREE WITH THOSE CONCLUSIONS?

A. YES.

Q. LOOKING AT THE SENTENCE WHICH FOLLOWS THE THREE CONCLUSIONS, "THE REPORT INDICATES THAT THE DECREASE IN DIVERSIONS AND RETURN FLOWS IS EQUIVALENT TO THE CONSUMPTIVE USE OF WELL WATER, WHICH FROM 1965 THROUGH 1972 WAS SAID TO AVERAGE 112,800 ACRE FEET PLUS PHREATOPHYTE LOSSES."

DOES THE DECREASE IN DIVERSIONS AND RETURN FLOWS TRANSLATE INTO A REDUCTION IN STATE LINE FLOWS IN YOUR OPINION?

A. NO, NOT IN THE EVALUATION THAT WE DID IN THIS REPORT.

Q. WHY NOT?

A. BECAUSE THE EVALUATION WAS COMPLETED IN '72, WE WERE LOOKING AT LOSS OF RETURN FLOW — OR THE DIMINISHMENT IN NET RIVER GAIN, IT'S A LUMP TERM — IN THE REACH AND NOT EXAMINED AT THE STATE LINE. AGAIN, INSOFAR AS THERE MAY HAVE BEEN WELLS IN 1972 PRODUCING BELOW THE BUFFALO HEADGATE, IT IS CONCEIVABLE THAT THOSE WELLS COULD HAVE AT TIMES CAUSED A DECREASE IN STATE LINE FLOW. WE DID NOT MAKE THAT DETERMINATION.

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Reply Appendix Item 16

Excerpt from R. vol. 84

May 24, 1991
(Direct Examination of Duane Helton)

[24-26]

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MR. DRAPER: LET ME JUST MAKE ONE POINT IN THAT REGARD, YOUR HONOR. I THINK THE REFERENCE THAT MR. ROBBINS MAKES TO THE ESTABLISHED RIGHTS UNDER THE COLORADO COURTS THAT WERE ENTERED MANY, MANY YEARS AFTER THESE RIGHTS MAY HAVE BEEN FIRST USED. WHEN THEY WERE ENTERED WITH A CERTAIN PRIORITY DATE, THEY WERE NOT GRANTED THE RIGHT TO PUMP OUT OF PRIORITY, WHICH IS WHAT THEY'VE BEEN DOING. IF THEY HAD, LET'S SAY, A 1947 PRIORITY DATE, THOSE WELLS HAVE NOT BEEN KEPT IN THAT NITCH IN THE PRIORITY SYSTEM. THEY HAVE BEEN LIKE A FIRST PRIORITY ON THE SYSTEMS THAT CAN TAKE OUT EVEN THE ROCKY FORD DITCH BECAUSE THEY PUMP UNREGULATED. AND I THINK IN THIS DISCUSSION OF LEGAL POINTS, IT'S APPROPRIATE FOR THE COURT TO KEEP THAT IN MIND.

SPECIAL MASTER: ALL RIGHT.

MR. ROBBINS: YOU'VE HEARD DR. DANIELSON'S TESTIMONY AND YOU'LL CERTAINLY HEAR MORE LEGAL ARGUMENT FROM ME ON THAT POINT, BUT AT THE BOTTOM LINE, THE COMPACT ALLOCATED THE RESOURCE BETWEEN TWO STATES ON A CERTAIN DATE AND COLORADO CITIZENS WHO HAPPENED TO BE TAKING FROM THE GROUND WATER SYSTEM AT THAT TIME, WHO HAPPENED TO HAVE BEEN PUMPING AT THAT TIME AND WHO WEREN'T AT THAT TIME ABLE EVEN TO GET A DECREE FOR THEIR GROUND WATER RESOURCES, THE FACT THAT THEIR OPPORTUNITY DIDN'T ARISE UNTIL

LATER SHOULDN'T BE TO THEIR DETRIMENT OR TO THEIR PREJUDICE.

AND THE QUESTION OF HOW COLORADO'S DITCHES AFFECT ONE ANOTHER, THE PRE-1900 DITCHES AND THE POST COMPACT 1900 WELLS, IS PROBABLY — IS AN ISSUE THAT COLORADO HAS BEEN WRESTLING WITH FOR 30 YEARS AND IS NOT AN ISSUE THAT ACCRUES TO KANSAS'S BENEFIT.

THEY ARE VERY MUCH LIKE, AT THE BANQUET, THE ANIMALS THAT GET AROUND THE TABLE, AND THEY WANT THE SCRAPS THAT FALL OFF, AND I DON'T THINK THAT THAT'S THE PURPOSE OF THIS PROCEDURE. I THINK THAT COLORADO WATER USERS WHO HAVE PRE-COMPACT WATER RIGHTS ARE ENTITLED TO THEIR PROTECTION.

SPECIAL MASTER: LET'S GIVE MR. DRAPER ONE COMMENT AND THEN LET'S NOT HAVE ANYMORE ARGUMENT AT THIS POINT.

IT IS CLEAR THAT INVOLVED IN THE PUMPING ANALYSIS, THAT THE WHAT IF PUMPING ANALYSIS IS A CERTAIN APPROACH WITH RESPECT TO THE PRE-COMPACT WELLS, AND THAT'S ONE OF THE THINGS THAT I WILL ULTIMATELY HAVE TO APPLY THE LAW TO AND TO ANALYZE AND TO REACH A DETERMINATION ON, AND SO I THINK THIS POINT, I DON'T REALLY NEED TO HAVE A LOT OF ARGUMENT ON IT. I SIMPLY NEED TO UNDERSTAND WHAT HAS BEEN DONE AND I THINK I DO THAT.

BUT YOU GET ONE LAST COMMENT, MR. DRAPER.

MR. DRAPER: THANK YOU, YOUR HONOR, I'LL KEEP IT SHORT.

WHEN WE PASS OVER TO WHAT AMOUNT OF PUMPING OUGHT TO BE GRANDFATHERED UNDER THE COMPACT, OUR POSITION IS THAT IT'S WHAT PUMPING WAS AFFECTING THE RIVER AT THE TIME

OF THE COMPACT. AND COLORADO, UNDER THE GUISE OF THESE DECREES, MOST OF WHICH WERE ENTERED WITHOUT OPPOSITION MANY YEARS LATER, THEIR POSITION IS THEY CAN INCREASE BEYOND THAT, INCREASE THE EFFECTS ON THE RIVER, AND I DON'T THINK THAT WAS THE INTENTION OF THE FRAMEWORK OF THE COMPACT.

SPECIAL MASTER: I THINK I UNDERSTAND KANSAS'S ARGUMENTS AND COLORADO'S.

MR. ROBBINS: BEFORE THINGS GET TOO FAR DOWN THE ROAD, THOUGH, I WANT MAKE IT CLEAR THAT THE INSINUATION THAT SOMEHOW SOMETHING IMPROPER WAS DONE IN A COURT OF LAW IN COLORADO ISN'T APPROPRIATE, YOUR HONOR, BECAUSE THE SUGGESTION IS THERE HAS BEEN A FRAUD PERPETRATED UPON THE COMPACT.

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Reply Appendix Item 17

Excerpts from Transcript vol. 125

(Direct Examination of Dale Book)

[59-61]

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SPECIAL MASTER: YOU DID NOT ESTIMATE PUMPING FIGURES FOR THE 1940 TO '49 PERIOD, DID YOU?

THE WITNESS: 1940 THROUGH 1947, I DID NOT, 1948 AND 1949, I DID.

SPECIAL MASTER: ALL RIGHT. ONE OF THE CRITICISMS THAT COLORADO EXPERTS MADE IN USING THE 11,000 FIGURE FOR 1948 WAS THAT THAT WAS A WET YEAR, AND THEREFORE, YOU WOULD BE LOOKING AT SURFACE DIVERSIONS WHEN PUMPING WAS DOWN.

DO YOU AGREE WITH THAT?

THE WITNESS: COLORADO'S ESTIMATES OF PUMPING SHOWN IN 165* INDICATE, BASED ON THEIR ESTIMATES, THAT THEY BELIEVE THAT THERE WAS PUMPING HIGHER THAN THE 1948 LEVEL FOR YEARS PRIOR TO [1948]. THE U.S.G.S. IN JOINT EXHIBIT 66, THEIR ESTIMATES WERE THAT 1948 WAS THE HIGHEST LEVEL OF PUMPING THAT HAD BEEN ACHIEVED UP UNTIL THAT TIME.

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SPECIAL MASTER: SO, MR. BOOK, YOU ARE SAYING THEN THAT THE U.S.G.S. CALCULATED 1948 AS THE HIGHEST AMOUNT OF PUMPING THAT HAD OCCURRED UP UNTIL THAT TIME, DURING THE '40'S.

THE WITNESS: THEY HAD AN ESTIMATE OF 15,000 ACRE FEET FOR 1946, '47, AND 1948.

SPECIAL MASTER: 15,000?

THE WITNESS: YES, FOR EACH OF THOSE YEARS.

BY MR. DRAPER:

• • • • •

SPECIAL MASTER: THAT IS FROM 1946 THROUGH '48?

THE WITNESS: THOSE ARE THE THREE YEARS THAT THEY HAVE THAT. THEIR TABULATION GOES BACK TO 1940.

SPECIAL MASTER: AND FROM YOUR CALCULATIONS, USING POWER RECORDS, YOU CONCLUDED THAT THAT WAS HIGH, THE 15,000?

THE WITNESS: FOR 1948?

SPECIAL MASTER: YES.

THE WITNESS: YES. THE REASON FOR THAT, WE ARE CONSISTENTLY BELOW THE U.S.G.S. VALUES FOR THE PERIOD 1948 THROUGH 1963. THEY USED A DIFFERENT METHOD OF CALCULATING OR REPORTING PUMPING IN BASIC DATA RELEASE 21 FOR THOSE YEARS. IT WAS NOT BASED ON THE FIELD INVESTIGATIONS OF THE WELLS. WE DON'T KNOW EXACTLY HOW IT WAS DETERMINED, BUT IT WAS BASED ON POWER RECORDS, GROSS POWER RECORDS FROM POWER COMPANIES.

AND IT APPEARS TO ME THAT THEY MAY HAVE SIMPLY TAKEN POWER DATA, TOTAL POWER DATA FROM THE COMPANIES AND APPLIED THE POWER COEFFICIENTS THAT THEY HAD DETERMINED IN THE FIELD IN THE 1960'S AND APPLIED IT TO ALL OF THE POWER WITHOUT ANY REDUCTION FOR THE AREA. BECAUSE WE MAKE THE REDUCTION FOR THE STUDY AREA, WE END UP WITH SLIGHTLY LOWER NUMBERS THAN THE U.S.G.S. FOR THE ENTIRE PERIOD OF 1948 THROUGH 1963.

I MIGHT POINT OUT THAT COLORADO, I GUESS WOULD TEND TO AGREE WITH THAT INTERPRETA-

TION BACK UNTIL ABOUT 1953. FROM 1953 THROUGH 1963, THE TWO STATES ARE VERY CLOSE IN THEIR ESTIMATES AND BOTH ARE BELOW THE U.S.G.S. TABULATION.

SPECIAL MASTER: ALL RIGHT.

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Reply Appendix Item 18

Excerpt from R. vol. 129

September 25, 1992
(Cross-examination of Thomas Major)

[34]

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Q. NOW, YOU HAVE SAID THAT YOU AND THOSE IN YOUR OFFICE OF THE G.S. TOOK FIERCE PRIDE IN THE ACCURACY OF THE REPORTS THAT YOU ISSUED; IS THAT A FAIR STATEMENT?

A. YES, SIR.

Q. AND THESE REPORTS WERE CAREFULLY CHECKED AND PEER REVIEWED BEFORE THEY ARE RELEASED TO THE PUBLIC?

A. YES, SIR.

Q. WHAT LENGTH OF TIME ELAPSED FROM THE END OF THE STUDY PERIOD TO THE PUBLICATION OF THIS REPORT DURING WHICH YOU AND OTHERS CARRIED OUT THAT CHECKING?

A. APPROXIMATELY TWO YEARS.

Q. ARE YOU AWARE THAT THE STATE OF COLORADO IN THIS CASE IS ATTEMPTING TO DISCREDIT CERTAIN INFORMATION IN THIS REPORT?

A. NO, SIR.

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[61-62]

Q. NOW, I WOULD LIKE TO CONFIRM MY STATEMENT THAT I THINK YOU HAVE MADE, AND THAT IS THAT YOU HAVE NO REASON TO DOUBT THE ACCURACY OF THE PUMPING FIGURES THAT ARE SHOWN IN BDR 21?

A. I DIDN'T DEVELOP THEM, AND I HAVE NO REASON TO BELIEVE THAT ANYONE WOULD DO ANYTHING THAT WOULDN'T BE ACCURATE.

Q. AND THOSE FIGURES WERE SUBJECT TO THE NORMAL PEER REVIEW AND CAREFUL CHECKING OF THE UNITED STATES GEOLOGICAL SURVEY?

A. YES, SIR.

Q. AND THAT WOULD INCLUDE IN PARTICULAR THE GROUND WATER WITHDRAWAL SHOWN IN FIGURE 3 OF THE REPORT?

A. WOULD YOU PLEASE REPHRASE IT, BECAUSE THERE ARE PORTIONS OF THIS THAT I CAN'T VERIFY AT ALL?

Q. THE QUESTION WAS WHETHER YOU HAD ANY REASON TO DOUBT, GIVEN THE PEER REVIEW AND CAREFUL CHECKING THAT YOU HAVE DESCRIBED, ANY REASON TO DOUBT THE ACCURACY OF THE GROUND WATER WITHDRAWAL FIGURES, THE PUMPING FIGURES SHOWN IN FIGURE 3.

A. KNOWING THE INTEGRITY OF TED HURR, I DON'T DOUBT IT AT ALL.

Q. WOULD YOU BE SURPRISED IF SOMEONE CLAIMED THAT THE FIGURES FOR 1940 WAS ACTUALLY 15 TIMES HIGHER THAN WHAT MR. HURR DETERMINED?

A. WITH THE BEST INFORMATION AVAILABLE, I'M SURE THAT'S WHAT HE THOUGHT WAS CORRECT.

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Reply Appendix Item 19

Excerpt from R. vol. 131

October 27, 1992
(Cross-examination of Harold Simpson)

[22]

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Q. WELL, THIS IS A DECREE OF THE WATER COURT, IS IT NOT?

A. YES, IT IS. BUT IT IS BASED ON INFORMATION PROVIDED BY THE APPLICANT.

Q. WELL, YOU ARE NOT SUGGESTING THAT PEOPLE FILED FALSE INFORMATION WITH THE WATER COURT, ARE YOU?

A. YES, I AM.

Q. WOULD THAT BE WHAT MR. ROBBINS HAS CALLED A FRAUD ON THE WATER COURT?

A. I DON'T KNOW WHAT HE CALLED IT. BUT I DO KNOW THAT IT HAPPENED. AND IT HAPPENED ESPECIALLY IN THIS TIME FRAME WHEN THERE WERE SO MANY APPLICATIONS FILED WITH THE COURT.

Q. NOW, YOUR OFFICE RELIES ON THE WATER RIGHTS DECREES, DOESN'T IT?

A. YES.

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Reply Appendix Item 20

Excerpt from

Colorado's Closing Brief Re Kansas' Well Claim

• • • • •

D. KANSAS IS NOT ENTITLED TO RELIEF FOR WELL DEVELOPMENT WHICH TOOK PLACE PRIOR TO 1963

[44]

Colorado raised various affirmative defenses in its answer to the complaint; however, in cases between States, the Supreme Court has not paid attention to labels, *Washington v. Oregon*, 297 U.S. at 528, but has focused on the equities of the case. *Colorado v. Kansas*, 320 U.S. at 394. As Justice Cardozo said in *Washington v. Oregon*, it is "high equity that moves the conscience of the court in giving judgment between states." 297 U.S. at 523. Therefore, in addressing the reasons that Kansas' complaint about post-compact well development in Colorado which took place in the 1950s and early 1960s should be denied; Colorado will not try to pigeonhole Kansas' actions as laches, estoppel, etc. but will focus on those factors which courts of equity have traditionally considered in deciding whether to give judgment.

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[48]

Given the fact Kansas failed to complain about post-compact well development in Colorado for many years, at least twenty years in the case of wells drilled in 1965, thirty five years in the case of wells drilled in 1950, Kansas should be barred from complaining about the effects of well development which occurred in Colorado prior to 1965. *Washington v. Oregon*, 297 U.S. at 528-29.

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Reply Appendix Item 21

Excerpt from

Colorado's Memorandum Re Matters to Be Raised at Oral Argument

[2]

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A. *LACHES*

Although the Special Master agrees that Kansas made no complaint about well pumping in Colorado until 1984 at the earliest, the Special Master may have felt constrained to reject the defense of laches because otherwise Kansas' delay would have barred relief against almost all of the wells in existence in 1985. Colorado suggests an alternate way to view Kansas' well claim and a method to apply laches which would produce a fairer result.

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[4-5]

The Special Master may have felt constrained to reach this conclusion because otherwise Kansas' delay would have barred relief against 1,842 out of 2,062 large capacity irrigation wells drilled before 1965. Draft Report at 165. There is, however, another way to view Kansas' claim. . . . Rather than view Kansas' claim as one based on well construction *per se*, the claim can be viewed as one based on well *pumping* and treated in the nature of a continuing nuisance, in which each year's well pumping gives rise to a new cause of action. . . . Viewed in this light, Kansas' delay might bar relief against post-compact well pumping through the mid-1970s which occurred without complaint by Kansas, but not the increased well pumping which occurred in later years. . . . Viewing Kansas' claim in this light would also allow the Special Master to acknowledge the substantial prejudice that Kansas' delay has worked on Colorado in trying to quantify depletions to usable Stateline flows which allegedly occurred up through the mid-1970s.

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[52]

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VI. CONCLUSION

Colorado believes that the draft report should be modified as follows:

1. Laches should bar Kansas' well claim for pumping which occurred up to at least 1975, ten years before Kansas complained about post-compact well pumping in Colorado.

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